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Imaging

EVALUATION OF RIGHT VENTRICULAR MECHANICS WITH 4D ECHOCARDIOGRAPHY: AN IN VITRO VALIDATION AGAINST SONOMICROMETRY

Poster Contributions
Poster Sessions, Expo North
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Session Title: Imaging: Echo: RV Imaging
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Background: 4D Echocardiography is an established assessment for wall motion tracking and allows analysis in 3-dimensions. The aim of this study is to validate RV strain by 4D echocardiography against sonomicrometry before and after infarction.

Methods: Four pig hearts and 1 sheep heart were studied in a water bath with the RV of the heart connected to a pulsatile pump to simulate the actual pumping motion of the heart. Sonomicrometry (sono) crystals were sutured onto the epicardium of the RV free wall to monitor longitudinal strain. Each heart was studied at stroke volumes (SV) 30 to 70 mL at increments of 10mL before and after injection of 2 mL of glutaraldehyde. 4D images were obtained with a GE Vivid E9 ultrasound system at frame rates 27.5 and 22.5 vps. Due to the lack of a RV analysis program, a LV strain analysis program, EchoPAC 4DLVQ, was used. The cardiac segment on which the sono crystals were sewn was manually found to be the midposterior segment. Sono data was obtained through SonoMetrics system and analyzed through SonoView and SonoCompare.

Results: Results: from both EchoPAC and SonoCompare showed an increase in RV strain in correspondence with increasing SV and an overall decrease in RV strain after infarction with glutaraldehyde. Linear regressions: (Normal R2=0.69, infarcted R2=0.8603).

Conclusion: Increasing SV correlated with increases in RV strain and cardiac infarction generally reduced RV strain, as demonstrated by both EchoPAC's 4D LV strain analysis program and sonomicrometry.